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Plant-Art

The Virtual and the Vegetal in Contemporary Performance and Installation Art

JOHN CHARLES RYAN

Introduction: Plant-Art in Context

Whether as paintings, sketches, textiles, or craftwork, plants have been integral to Western art through the ages. Florilegia, herbals, botanical illustrations, pressings, and other renderings of whole plants and, very often, of their flowers comprise part of the tradition of plants in art. Closely related to these visual forms are tactile and sensory practices engaging plant materialities and involving, for example, natural dyes from roots, resins turned into adhesives, figurines sculpted from fine wood, and leaves incorporated into the texture of an artwork. A third dimension of the plants-as-art tradition regards the vegetal (the tree, herb, orchid, flower, trunk) as an intrinsically living work of art—a complete botanical form not requiring visual rendering or material manipulation by humans to become an artwork. As such, a plant is *a priori* a paragon of natural beauty and an expression of harmony, symmetry, color, and other aesthetic qualities *in itself*. This latter aspect involves the appreciation of botanical nature on its own terms—in its raw state—without the intervention of an artist. These three elements of the tradition of plants in art—let us call them "visual plant art," "tactile plant art," and "plants-as-art"—have been transformed by the introduction of digital technologies into creative practices since the 1990s. Hence, there is presently a need to articulate a fourth element of the plants-and-art tradition—the subject of this article—which I will call

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"plant-art," with a conjoining hyphen signifying the inseparability of the two terms. Here, living plants—not necessarily the most aesthetically pleasing ones—are involved fundamentally as agents, actants, and cocreators in digitally based works.

Involved in this manner in the becoming of a digital artwork, plants are neither the objects of aesthetics nor the subjects of a preservationist environmental ethos. Rather, they are positioned integrally as agents in the world, bringing together the natural and the virtual within a single work (Hitchings 2003; Latour 1987, 2005; Tsing 2010). The plant-art work becomes a dynamic, shifting, and organic locus, or what Donna Haraway terms a "terrapolis"—a "'niche space' for multispecies becoming-with" that is "open, worldly, indeterminate, and polytemporal" and rich in "materials, languages, histories, companion species" (Haraway 2011, 12). Despite the work of Haraway and other posthumanist scholars, the concept and the practice of digital plant-art represent an interbreeding of technology, art, and plant biology that has received surprisingly limited scholarly attention (Nemitz 2000; Wilson 2002, 18-20). Meanwhile, there are numerous precedents for thinking about visual plant art (Blunt and Stearn 1950; Saunders 1995); tactile plant art, especially in Indigenous traditions (Clarke 2007); and plants-as-art (Ryan 2012a, 111–30). In order to articulate a fourth intersection of art and flora, this article foregrounds the use of living plants as agents in digital art through a reading of several contemporary examples. The "co-becoming other" (Mules 2014, 22) of the virtual and the vegetal—of the artwork and the sensing and sentient plant—takes place when artists and audiences interact with flora during the creation of time-based, open-ended, or participatory works. More specifically, in this article, five representative plant-based performances and installations will be considered, beginning with Christa Sommerer and Laurent Mignonneau's seminal visualization *Interactive Plant Growing* (1992) and concluding with Chiara Esposito's imaginative *The Dream of Flying* (2013).

Despite a range of possible conceptual approaches, including feminist science and technology studies (Haraway 2011; Hayles 2002), three frameworks will be invoked in order to theorize aspects of human-plant-technology co-becoming, multispecies relationality, and bioartistic affect in plant-art works. These include digital theorist Roy Ascott's concept of "moistmedia" (Ascott 2000), Warwick Mules's interpreta-

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tion of *poiesis* outlined in *With Nature* (2014), and the emerging field of inquiry tentatively called "human-plant studies" (Ryan 2013, 72–89). Human-plant studies describes the growing interdisciplinary dialogue between new, though contentious, scientific research into plant neurobiology (for example, Trewavas 2006) and emerging literary, artistic, cultural, ethical, and philosophical approaches to plants (for example, Marder 2013). This article develops the position that underlying these performances and installations is a perception of plants as *interdependent* in their environments—as *autopoietic* beings with nuanced sensory and decision-making faculties that enable them to participate in the event of an artwork (Mules 2014, 80). In addressing the epistemology of plant-art works—the means through which knowledge is produced through them—I will focus on three elements intrinsic to these frameworks: relationality, co-becoming, and affect.

Digitality, Moistmedia, and Human-Plant Studies

The concept of plant-art that is developed in this article depends on a definition of digital art— "art made with, and for, digital media including the internet, digital imaging, or computer-controlled installations" (Graham 2007, 93). Broadly defined as art incorporating technological practices, digital art is "characteristically in a state of flux" (Graham 2007, 106). The flux results, in part, from the mutability and constant evolution of the technologies and approaches used by artists. The sheer diversity of names—often erroneously applied as synonyms for "digital art"—is further indicative of the flux and includes new media, multimedia, computer, software, hypermedia, emergent media, unstable media, electronic, and Internet art. For example, Internet art is based on the Internet; browser art specifically makes use of Internet browsers; and software art involves the use or creation of computer software. Other terms related to digital art—including behaviorist, interactive, and sound art—are more inclusive than "digital art" because they encompass both analogue and digital art practices, ranging, for example, from site-based installation works to Internet-controlled telerobotics. Still, other terms are period specific and seem like anachronisms now. These include "net.art," which designates the digital art of practitioners working in the 1990s when Internet technologies began to emerge in the public domain (Ryan 2014). Although technological in character,

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many digital artworks are also highly conceptual; interactive; open-ended; process based; and, in the case of plant-art, organic, hybridic, and relational. The inclusion of real plants in artworks is an extension of the inherent flux of digital art as a genre and practice and, moreover, indicates the variety of works signaled by the term.

How might we characterize artworks that merge inert technological material (plastic components, memory cards, data flows) and actual flora (trees, shrubs, vines, herbs, common potted plants)? What does a plant become—how does it change or remain the same—when incorporated into an artwork as a biological interface between human participants and the digital apparatus of the work? The speculative writings of art theorist Roy Ascott (2000) offer a basis for conceptualizing the vegetal and virtual relationship. In particular, Ascott's "moistmedia" signifies the hybridization of the "dry" plastics and pixilations of the digital realm and the "wet" molecules and matter of the biological world within a new-media artwork. In Ascott's terms, moistmedia (including plant-art works) lead to "edge-life" or new forms of identity, sociality, and aesthetics that combine digital and biological exigencies (Ascott 2000, 2). In short, edge-life entails the hybridization (rather than the polarization, if that were even possible in today's world) of the virtual and biological, the digital and material. Ascott further speculates that moistmedia "comprising bits, atoms, neurons and genes" leads to a "transformative art concerned with the construction of a fluid reality" and the "recognition of the intelligence that lies within every part of the living planet" (Ascott 2000, 2). The virtual-vegetal dialectic is "technoetic"—the amalgamation of *techne* (in Heideggerian philosophy, a means of technical control, world shaping, and visual rendering) and *gnosis* (or spiritual knowledge about the world, culminating in enlightenment or insight). As indeterminate, fluid, and self-regulating systems, moistmedia prompt the rethinking of the very premises of intelligence, consciousness, and sentience:

> Moistmedia is transformative media; Moist systems are the agencies of change. The Moist environment, located at the convergence of the digital, biological and spiritual, is essentially a dynamic environment, involving artificial and human intelligence [and plant intelligence] in non-linear processes of emergence, construction and transformation. (Ascott 2000, 4)

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"Moist" is a mediating category between the digital and biological, the immaterial and material, the inanimate and animate. In similar terms, Ascott goes on to define "cyberbotany" as the intelligent application of plant "technologies" to the complexities of the biological-digital intersection and to the aesthetics of creative production in new-media environments (Ascott 2000, 6). Cyberbotany signifies the co-becoming of the digital and vegetal that typifies a work of plant-art and other forms of botanical art as well. Along comparable lines, biologist Stefano Mancuso uses the term "bio-inspiration" to refer to the application of plant intelligence to the design of computers and society, resulting in systems that are "networked, decentralized, modular, reiterated, redundant and green" (Pollan 2013, 104–5). The intelligence of the plants—circumscribed by their capacities for communication and behavior—intersects with the *poiesis* (the making or bringing forth) of the artwork. In plant-art works, the *autopoiesis* (self-making-becoming) of the plant underlies the *poiesis* (making-becoming) of the digital system.

In addition to moistmedia and bioinspiration, human-plant studies (HPS) presents a framework for investigating plant-art works and their contexts (Hall 2011; Marder 2013; Ryan 2013). John Ryan outlines the premises and tenets of HPS: (a) plants are always intelligent and volitional organisms; (b) plant intelligence is integral to socioecological networks and practices; (c) plant intelligence is a viable exemplar for human societies, cultures, and communities; (d) the roles of plants in society are best articulated through interdisciplinary research spanning art, literature, philosophy, Indigenous knowledges, and science; and (e) HPS complements, but departs from, the existing academic discourses of ethnobiology, ethnobotany, economic botany, and other cognate but different socially and culturally based fields of plant research (Ryan 2013, 77). Although an interdisciplinary field, HPS is strongly underpinned by trends in "plant neurobiology" and research into plant cognition, acoustics, learning, and memory (see, for example, Gagliano 2012; Gagliano et al. 2014, Trewavas 2006). HPS acknowledges that mainstream plant science tends to classify vegetal behaviors as tropisms—mechanical responses attributable to electrical or hormonal flows (where the chemical auxin is often involved). These dominant science-based rationales for plant behavior do little to foster the rethinking of intention, consciousness, emotion, self-awareness, or cerebrality—root-bound or otherwise. Instead, they reinforce and privilege the Cartesian

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premise of the human subject with brain-bound intelligence. Indeed, part of the scientific resistance to plant neurobiology could be the moral implications of plant consciousness, which, if given cultural traction, could rouse the broadscale reconsideration of vegetal pleasure, pain, and ethics (Hall 2011).

Nonetheless, with current science as its reference point, HPS explores the intelligent *habitus* of plants, including their "sessile life styles" and sense capacities in relation to human powers of smell, taste, sight, touch, and hearing (Chamovitz 2012). These scholars—although aligned to different disciplines—hold that the reconsideration of plants in Western thought demands a "democratic" definition of intelligence, one that is not restricted to mammals and one that acknowledges the capacity of plants to solve problems and adjust to an environment (Pollan 2013, 100). Moreover, following Hayles and other scholars of feminist science studies, a "distributed" concept of intelligence also recognizes that cognition is not circumscribed by the processes of the brain alone but rather is a "systemic activity, distributed throughout the environments in which humans move and work" (Hayles 2002, 4). A noncerebrocentric mode of intelligence calls for a variety of actants that are human and nonhuman, animate and inanimate, comprising artists, audiences, plants, and technological apparatus, all working in dynamic relation to their environment, including the gallery space and the interiority of their bodies.

HPS explores the philosophical implications of plant intelligence as "distributed" or "swarm" intelligence—a category usually applied to social insects such as termites and bees to foreground the primacy of "the connections between the individual workers that form a network and changes in communication [that alter] the behavior of the whole colony" (Trewavas 2006, 7). Like the science with which it engages, HPS counters the cerebrocentric or animal-focused conceptualization that permeates our understanding of intelligence and situates the mind in the brain (Niemeier 2011, 48–49). Plant physiologist Anthony Trewavas—perhaps the most unapologetic proponent of intelligence in plants—uses the term "mindless mastery" (Trewavas 2002). Additionally, Michael Pollan characterizes a "leaderless network" in terms that evoke Deleuze and Guattari's antihierarchical metaphor of the plant rhizome (Pollan 2013, 100). With these views in mind, researchers across the humanities and sciences increasingly argue that plant intelli-

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gence must be understood on its own terms—involving a considerable rethinking of the vegetal in Western thought that engages a sustained and critical examination of language (Vieira, Gagliano, and Ryan 2015). As a form of sensory expression, plant-art can be positioned within the critical HPS context. Many plant-art productions call attention to different manifestations of botanical volition as plants decide—in a seemingly spontaneous and unchoreographed manner—to participate in (or opt out of) a work. As we will see later in this article, Natasha Myers problematizes the possibility of plant volition in art through the phenomenon of "lag" (Myers 2013). In sum, plant-art situates plants integrally in the design of the artwork, thereby addressing, although not entirely resolving, anthropocentric representation and aestheticization. Intelligent plants, therefore, become contributors to the creative arcs of digital works, especially process-oriented installations.

Sensory Ecologies: Seeing and Touching Plants

One of the salient features of plant-art, highlighted in this section, is sensory interaction between visitors and flora through the interplay of different sense modalities—both human and botanical. The following works of plant-art draw attention to the complex entanglements between vegetal and human sensoria, as well as plant and human existentiality. The elements of relationality, co-becoming, and affect that underpin plant-art works also influence the sensory ecologies of the installations and performances such that the individuated sensoria of actants necessarily become collective cosensoria impacting and configuring each other. A seminal plant-art work of this type is Christa Sommerer and Laurent Mignonneau's *Interactive Plant Growing* (1992), which used living plants as active interfaces between gallery visitors, the computer system, and the artwork.[1] The digital-vegetal installation—now held in the permanent collection of the Zentrum für Kunst und Medientechnologie, the media museum in Karlsruhe, Germany—exemplifies the possibilities of visual and haptic human-plant interactions. Participants could generate three-dimensional images of virtual flora when they touched or approached living plants. The visualization of botanical growth on the projection screen was moderated in real time by human-plant encounters in the interior space of a gallery. The installation innovated the use of plants as a "natural and tangible inter-

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face" in a work of computer art, instead of commonplace, "dry" technical interfaces, such as joysticks and keyboards (Sommerer and Mignonneau 2011a, 206). Moreover, *Interactive Plant Growing* made possible a human-plant "dialogue" in which people participated in the creative process through botanical interfaces, resulting in an "open-ended artwork that is not predefined" (Sommerer and Mignonneau 2011a, 206). As the artists further comment, "In 1992, using plants as interfaces to create awareness about the human-to-plant relationship by creating an artistic interpretation of this minute dialogue was very unusual" (Sommerer and Mignonneau 2011a, 207).

The work involved five different living plants—a fern, an ivy, a cactus, moss, and a small tree—placed in a semicircle on five wooden columns directed toward a twelve-by-nine-foot video projection screen (Deussen and Lintermann 2005, 240). Measurements of the differences in electrical potentials—the voltage—between the bodies of plants and the bodies of visitors triggered the generation of images of floristic growth on the large screen. The voltage differential depended on the distance between a participant's body and the plants. Electrical charges registered when a participant's hand was between zero and seventy centimeters away from one of the species. As visitors interacted with real plants in the gallery, the screen filled increasingly with a junglelike visualization of ferns, ivy, grasses, mosses, and trees. The cactus served as an eraser plant, resetting the screen when touched. Each real plant corresponded to a virtual plant and to a discrete algorithm that generated a visual representation of its living correlate. In total, Sommerer and Mignonneau developed five algorithms reflecting the real morphological changes of the five plants over time in order to translate the people-plant electrical differential into tapestries of virtual growth. For each plant algorithm, there were several randomizing variables that determined the composition of the imagery—including stem length, width, curvature, branching angle, and color. As with other examples of digital or computer art, an algorithm developed by the artist-programmers controlled the translation process, in this instance, between the voltage differential, the variables, and the garden-like visualization (to view the work, see sommerermignonneau 2009).

This dialogic basis of *Interactive Plant Growing*—involving an ongoing feedback loop between plants, humans, and technology—can be theorized through the concept of "gesture." Gesture can be defined phe-

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nomenologically as "the openness of the body to the outside" during which embodied contact with the world is made (Mules 2006, 6). As "sensuous movements, leading to intimate encounters of touch, taste, smell, sound and looking closely" (Ryan 2012b, 29), gesture disrupts the space of disinterested aesthetic appreciation intrinsic to many traditional works of visual plant art. Indeed, gesture was a core attribute of Sommerer and Mignonneau's installation and its open-ended and embodied aesthetic. It promoted a sense-engaged creative process, hybridizing the virtual and the vegetal in one indeterminate, open-ended "moist system." The simple acts of getting close to and feeling the leaves of plants were intimate sensory gestures that influenced the composition of the garden-like imagery and infused the digital system with the "wet" matter of the biological world. The installation invited visitors to participate—sensuously and cognitively—in the ever-shifting arc of the visual artifact through their gestures toward plants, registered technically as voltage differentials between bodies in contact or approaching the moment of contact. Moreover, the participant's somatic influence over the information transmitted from the plants to the computer underscored issues of human-plant communication and biological feedback mechanisms. The moist installation depended completely on human-flora dynamics, which, in turn, depended wholly on simple, intuitive human gestures toward plants. Interdependent with participants, the plants were able to express themselves as somewhat "intelligent" collaborators (necessarily defined in nonzoocentric and distributed terms), rather than passive objects of representation. As a whole, the installation took the form of a self-regulating, open system capable of spontaneity and complexity. Thus, it exemplified Ascott's assertion that "moist systems are the agencies of change." The change that resulted was both intrinsic (the constantly morphing garden visualization) and extrinsic (the fostering, through art, of cultural perceptions of commonplace plants as creative agents) to the artwork.

A more recent installation by Sommerer and Mignonneau, *Eau de Jardin* (2004)—translated from French as "water garden"—was inspired by Monet's oil paintings of water lilies, created throughout his career but most prolifically toward the end of his life from 1920 to 1926. Modeled structurally on the panoramic layout of the Monet paintings at the Musée de l'Orangerie in Paris, the interactive installation was developed for the House of Shiseido in Tokyo. The work used a thirty-six-by-nine-

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foot, three-sided projection screen to create an immersive triptych of a water garden, including a pool that reflected images of the virtual plants (Sommerer and Mignonneau 2011b, 45). Ten transparent amphorae, hung from the gallery ceiling, contained aquatic plants, such as lilies, lotus, cypress, and bamboo, with their roots and soil visible to viewers through the glass of the vessels. The digital technology of the installation reflected their earlier work *Interactive Plant Growing* in which the voltage differentials between the visitors' bodies and the living plants were processed through a computer algorithm to generate plant images on the triptych screen. The computerized plants—populating the water garden—mirrored their living counterparts in the amphorae, while these plant images reflected on a virtual water surface. Unlike *Interactive Plant Growing*, *Eau de Jardin* involved a unique visual interlayering of virtual and reflected plant representations. However, in keeping with their previous work, the water garden shifted in composition according to visitor numbers and the intensity of human gestures toward the real aquatic plants. The translation of visitor dynamics in the gallery to renderings on the screen, again, highlighted the conceptual and technical centrality of human-plant interaction in works of plant-art. As an expression of moist media, *Eau de Jardin* resulted in a "wet" environment (both biological and digital), crossing virtual and vegetal realities and merging artificial, human, and plant intelligences (to view the work, see MediaArtTube 2008).

Affective Ecologies: Singing, Flying, and Playing Plants

Interactive Plant Growing and *Eau de Jardin* connected visual and tactile contact with real plants in a gallery to the algorithmic genesis of virtual plants on a projection screen. In contrast, the interactive installation *Akousmaflore* (2007), by artists Grégory Lasserre and Anaïs met den Ancxt working under the name Scenocosme, blended haptic, acoustic, and kinesthetic modalities.[2] Touching or simply approaching six potted plants hanging from the ceiling, a viewer triggered a symphony of acoustic loops that gradually increased as visitor-plant interactions intensified. In response to different forms of gesture and movement, each hanging plant yielded specific vocalizations, expressions, and textures. For example, the plants sang when touched or stroked. When hugged, some plants squealed. The ambient effect corresponded to the potted

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plants' excitation levels expressed by the voltage differential between them and human visitors. The artists described *Akousmaflore* as an acoustic system hybridizing living plants and digital technology and capitalizing on the ability of plants to function like "natural sensors" (Lasserre and Met den Ancxt 2016, para. 2). The integration of the natural sensing capacity of plants and the digital apparatus of the work echoed Ascott's concept of "cyberbotany" and Mancuso's "bioinspiration," discussed previously. Similar to the installations of Sommerer and Mignonneau, the algorithmic basis underlaid a relationship between people, plants, and sound through the flow of data. Embodied experience in the gallery prompted the reconsideration of our perceptions of living things—particularly, common houseplants, which "have an ambiguous existence that swings between decorative object and living being" (Lasserre and met den Ancxt 2014, para. 3). As with other plant-art works, *Akousmaflore* also exhibited a symbiotic co-becoming between digital technology and plant nature in the otherwise "denatured framework" of sensing instruments and computer equipment (Krajewski 2013, 138). This co-becoming was the open-endedness of the work and the basis of its epistemology (to view the work, see Scenocosme Gregory- Anais 2012).

Like *Akousmaflore*, *Singing Plants Reconstruct Memory* (2010), by Canadian new-media artist Jo SiMalaya Alcampo, was an interactive, mixed-media plant-art installation in which sounds were produced in response to interactions with plants in a gallery. Alcampo, who grew up in the Philippines, was meditating on her childhood traumas through the work's unique arrangement of potted plants, electronics, soundtracks, film, and video (Spooner 2010). The performance involved small banana plants connected to pressure-sensitive instruments. When the plants were touched, voltage passed into a grid controlling a soundtrack of traditional Filipino instruments and chants, as well as a projection of archival film footage from Alcampo's childhood. When watered, the plants played the music and footage continuously, indicating their higher levels of excitation. Wounded banana leaves were sutured by the artist, providing another somatic stimulus for the flow of sound and audiovisuals and connecting Alcampo's trauma to the pain (possibly) experienced by plants. Curator Rosie Spooner characterizes the performance as "memory work"—the unearthing of stories long concealed or repressed—in which plants are "silent witnesses"

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(or, in the case of this work, *not-so*-silent witnesses) to trauma and the "keepers of cultural memory, muted histories and forgotten experiences" (Spooner 2010) (to view the work, see Alcampo 2015).

For anthropologist Natasha Myers, lag is pivotal to interpreting *Singing Plants* or, more precisely, to anticipating how the work *might* be read (Myers 2013). A lag is a delay in response time—or sometimes a complete absence of response—between the moment of human interaction with the banana plants and the production of aural or visual effects in the artwork. As a gap in the call-and-response pattern, lag can be regarded as an expression of agency and subjectivity as the plant decides when to respond, participate, or perform. Alcampo's use of lag contrasts to the common scientific model of response, which would regard lag as a distortion or anomaly in reaction to mechanical or chemical stimuli. Although she problematizes the premise, Myers argues that "lags are read as recalcitrance, a plant's uncanny hesitation. It is in the space of this silence, a withholding or reluctance to respond to experimental demands, that plants seem to assert their agency" (Myers 2013, 4). She goes on to propose "moral and affective ecologies" or "the values, anticipations, feelings and desires that shape how and what plants get to express in their experimental configurations" (Myers 2013, 4). When an experimental configuration involves the feedback loops of a moist system, feelings and desires take shape between species. Thus, visitors reported feeling satisfied and moved by a banana plant's perceived response (Alcampo 2010). The heightened awareness of plant volition—evident in *Akousmaflore* and *Singing Plants*—also underscores the nonzoocentric and distributed principles of intelligence that inform human-plant studies.

Chiara Esposito's *The Dream of Flying*, featured in the 2013 Ars Electronica Festival, responds to the common assumption that plant movements are slow, minute, and typically imperceptible responses to stimuli.[3] A digital interface enables an air plant (*Tillandsia* spp.) and a common dandelion (*Taraxacum* spp.) to control their own movements on a small flying device. Voltage differentials between the plants, the visitors, and the gallery environment determine the movements of the plant's "body extension" or flying device. Like all works of plant-art featured in this article, the air plants and dandelions of Esposito's *The Dream of Flying* are living sensors and natural interfaces between human participants and the open system of the digital installation. The

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salient quality of the work is its affective ecology of joy, playfulness, exuberance, and freedom that so markedly departs from the serious, sexualized, and opportunistic Darwinian plant constructed by botanical science for centuries. As such, plant intelligence becomes a viable exemplar for the digital artwork, as a moist system hybridizing the vegetal and the virtual (to view the work, see Chiara Esposito 2013).

Conclusion: Earthing Digital Art through the Vegetal

The plant agency on display in these works parallels the new scientific understandings of research on plant signaling and behavior. These examples—in conjunction with the research they signify—counter the mechanistic understanding of plants as automatons, materials, or mere aesthetic features of landscapes. Indeed, writers and researchers from different disciplinary backgrounds have begun to critique the view of plants as "passive objects—the mute, immobile furniture of our world" (Pollan 2013, 94) that still permeates the traditional biological sciences as well as many Western cultural and humanities-based ideas of the vegetal. For Michael Marder, plant thinking redresses the "systematic devaluation of vegetal life in Western thought" while also allowing for human encounter with plant difference (Marder 2013, 24). He describes "vegetal existentiality" as "the time, freedom, and wisdom of plants [that] will come to define the positive dimensions of their ontology" (Marder 2013, 90). Hence, thinking with plants is a mode of thinking that comes to reflect the particular habitus of the vegetal world, in contrast to reinscribing the zoocentric logos that dominates concepts of intelligence, sentience, and moral consideration. The critique of the devaluation of plant life also underlies the emerging field of human-plant studies in which plant-art can be contextualized.

However, in addition to prompting the rethinking of plants, the works featured in this article also signify a broader relationship between the digital and vegetal—between the immaterial and material, the technological and organic—that is *poietic*. In relation to the *poiesis* of these works, digital plant-art offers an example of "earthing the world" in which art comes to bear a material relationship of becoming with the earth and with technology in an open-ended and indeterminate mode (Mules 2014). As such, the *autopoiesis* of flora—the becoming that is proper to plants in relation to their physiologies, motilities,

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sensorialities, temporalities, and ontologies—intersects with the *poiesis* of artworks, defined as the event of an artwork, including the processes whereby the work *becomes* (or is the constant state of becoming) through a feedback-driven process linked to its environment. The work of art and the *habitus* of the living plant are commingled and interdependent as part of the moist system of the digital artwork. Relationality emerges as plant-art actants influence and configure each other, shifting "the focus from entity [i.e., the artist, audience member, or individual plant] to relation [i.e., the artwork as a moist, open, and intelligent system]" (Hayles 2002, 6).

Whether or not plant-art affirms or further calls into question contested notions of plant agency, intelligence, subjectivity, consciousness, and behavior is debatable and is not even nearly resolved by these examples. However, there is no doubt, at least in my mind, that further exchange between emerging plant science and works of plant-art will continue to stage vegetal existentiality and the "ontology of plants" (Marder 2013, 164), facilitating human encounters *with*, appreciation *of*, and ethical regard *for* plant difference in the midst of the relationality of moist systems. Concepts of relationality and difference resist what we construct plants to be (i.e., passive and aesthetic objects), a determinate and zoocentric mode of thinking that has dominated Western epistemology for centuries (Ryan 2012a, 13–36). In highlighting and putting into practice the particular agencies of plants, the moist systems of plant-art also bear implications for vegetal ethics and politics. Rather than the materials manipulated (dyes or fibers) and the objects fetishized (pleasing or symmetrical) of tactile and visual plant art, respectively, or the subjects dematerialized of plants-as-art, the air plants and dandelions of plant-art are actants, contributors, and participants embodied in the event of digital art. Hence, the biopolitical register of these works exists alongside other interfaces between vegetal life and technology, in which plant ontology is put to work or mirrored, including recent productions of "bio-inspiration" (Mazzolai and Mancuso 2013) and advances in "plantoid" robotics (Mazzolai 2010). To leverage a term from animal ethics, sentient plants are positioned as "subjects-of-a-life" (Regan 1993, 43) in works of plant-art, alongside other participants and actants. Nevertheless, one could argue that the plants are indeed conscripted; staged; and, to some extent, manipulated for the creative intentions of the artists and audience. However, I suggest that the foregrounding of the vegetal

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capacity for excitation and lag, consistency and mutability, vocalization and silence calls attention to their subjectivities and resists their devaluation as the "immobile furniture of the world" (Pollan 2013, 94).

Moreover, the intimate involvement of living nonhuman beings in the digital infrastructure of plant-art works "earths" the overwhelmingly "dry" technological preoccupation of the genre since the 1990s. The plant-art installations and performances of this article—in contrast to *techne*—rematerialize art through the use of living things that always "refuse *techne* and affirm themselves as other" (Mules 2014, 197). And "by thinking with these things in their refusal, we open the technology [and, I will add, the art] otherwise" (Mules 2014, 197). However, the refusal of *techne* through the agencies and subjectivities of plants is conversely a symbiotic co-becoming—the moist system of the plant-art work being the outcome of sustained feedback and dialogue between human beings, plants, and technology. The refusal *is* the open-endedness of the system of which the living plant is part. The renaturing of digital art through the use of living plants that can *refuse*—a renaturing involving the sensory and affective capacities of plants and people—preserves the "poietic openness" (Mules 2014, 11–12) of the works. It is this poietic openness that distinguishes plant-art from visual plant art, tactile plant art, and plants-as-art. Whereas visual plant art, tactile plant art, and plants-as-art form exact degrees of representation or manipulation, plant-art produces a flux of meaning iteratively between the plant, artist, audience, and artwork in sensory contact. This flux is the basis of the co-becoming between us and other, between nature and technology, between the vegetal and digital, and is a salient mark of plant-art. The openness also casts a light on the potentialities of human relationships to the botanical world in the context of increasingly technological forms of art.

ABOUT THE AUTHOR

John Charles Ryan *is postdoctoral research fellow in communications and arts at Edith Cowan University in Perth, Australia. He is the author of the books* Green Sense: The Aesthetics of Plants, Place and Language *(Oxford, UK: TrueHeart Press, 2012);* Two with Nature*, with Ellen Hickman (Fremantle, Australia: Fremantle Press, 2012);* Unbraided Lines: Essays in Environmental Thinking and Writing *(Champaign, IL: Common Ground, 2013);* Digital Arts: An Introduction to New Media*, with Cat Hope (New York: Bloomsbury, 2014);*

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Being With: Essays in Poetics, Ecology, and the Senses *(Champaign, IL: Common Ground, 2014); and* Posthuman Plants: Rethinking the Vegetal through Culture, Art, and Poetry *(Champaign, IL: Common Ground, 2015). He is the coeditor of the collections in the field of critical plant studies* The Green Thread: Dialogues with the Vegetal World *(Lanham, MD: Lexington Books, 2015) and "The Language of Plants," which he is currently working on with Patrícia Vieira and Monica Gagliano. His interests include the environmental humanities, ecocriticism, ecocultural studies, ecopoetics, plant studies, and practice-led research. His project FloraCultures is a digital archive of plant-based cultural heritage (http://www.floracultures.org.au).*

NOTES

1. To view still images of *Interactive Plant Growing*, see Sommerer and Mignonneau 2011b.
2. To view still images of *Akousmaflore*, see Lasserre and met den Ancxt 2016.
3. To view still images of *The Dream of Flying*, see Esposito 2013.

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